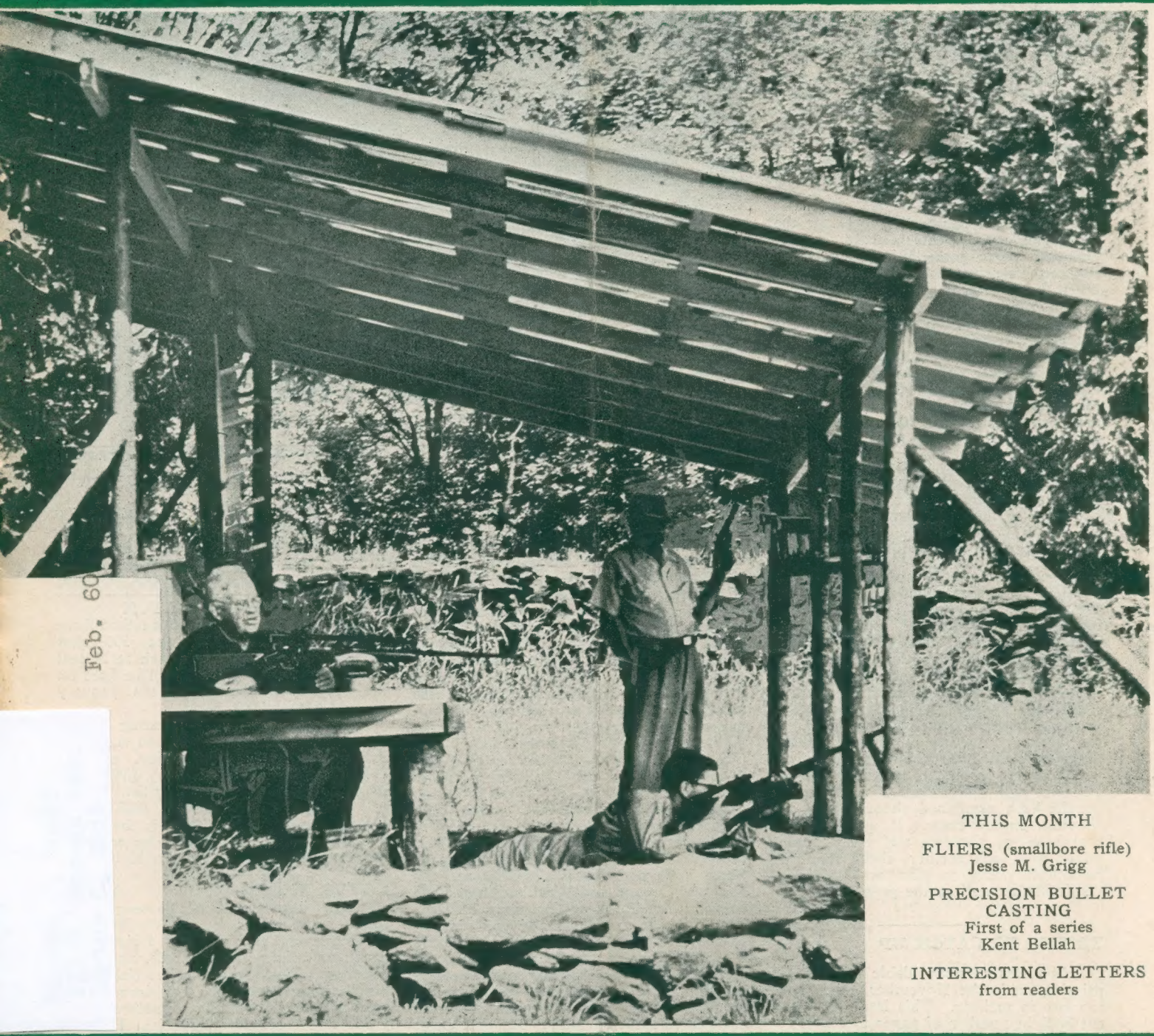
Precision SHOOTING

December 1958
Vol. 3, No. 8



THIS MONTH

FLIERS (smallbore rifle)
Jesse M. Grigg

PRECISION BULLET CASTING
First of a series
Kent Bellah

INTERESTING LETTERS
from readers

a magazine for Shooters by Shooters

Precision Shooting is published monthly by Precision Shooting, Inc.

Editorial and business office at 64 Depot Street, Lyndonville, Vt.

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Subscription rates:—To the U. S., Canada and Mexico, 1 year $4.00, 2 years $7.00, 3 years $9.00. All other countries $1.00 per year additional.

Change of address requires 30 days' notice.

Authorized advertising representatives:—Howland & Howland, Inc., 114 East 32nd Street, New York 16, N. Y.

Precision Shooting is entered at Post Office, St. Johnsbury, Vt. as second-class mail.

MAYBE WE HAVE FORGOTTEN

The letter from Bill Edwards, GUNS Magazine technical editor, presents a viewpoint of the present flood of obsolete foreign military weapons being sold cheaply in this country that I have overlooked completely, and perhaps some of you have. Perhaps we should reappraise this situation.

This writer has tended to forget that his beginning of real interest in rifle shooting began some 35 years ago with the purchase from the DCM of a five dollar Krag carbine and a case of surplus World War I ammo for less than two sawbucks. I suspect that some of you readers of middle-age or more had a similar awakening of real rifle shooting interest. Is there any reason to doubt that today's availability of cheap, "obsolete" but sound foreign made military weapons may have a similar result of awakening shooting interest?

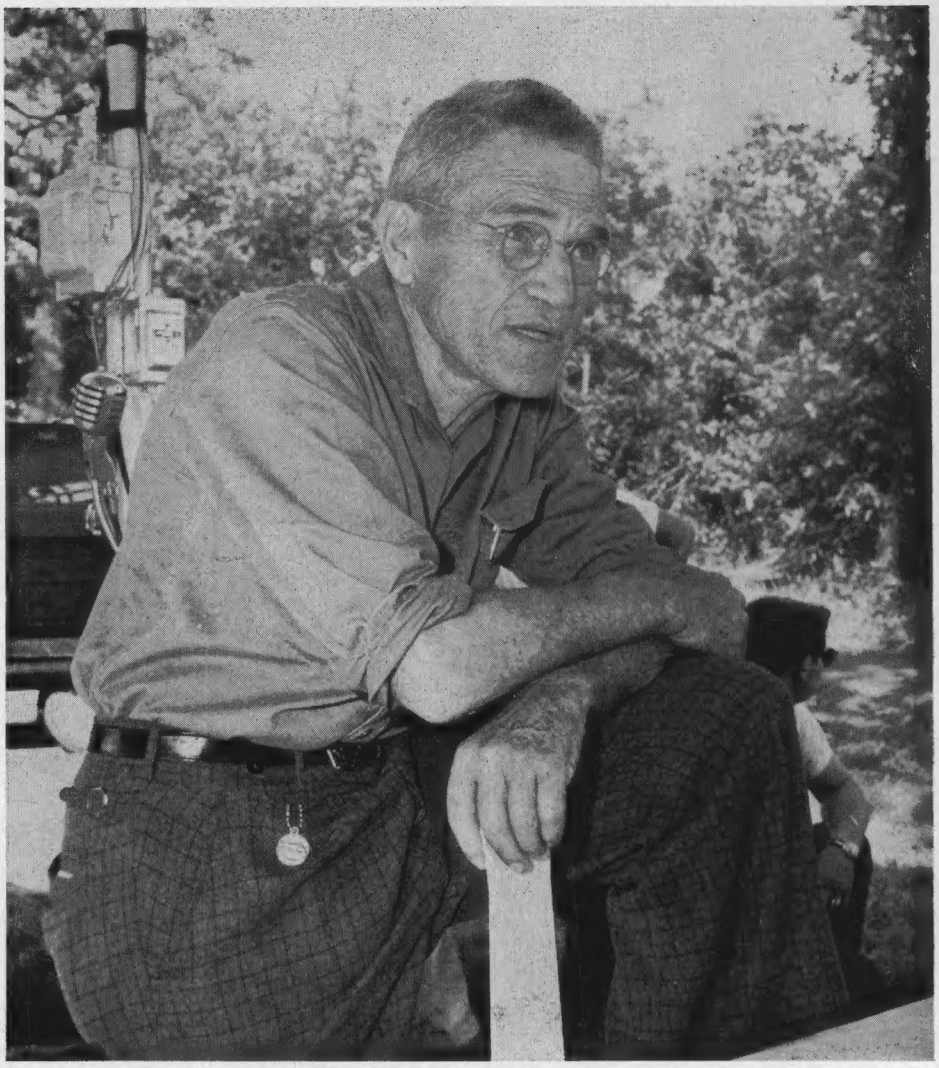
It would appear that we in organzied shooting might better encourage and aid these new shooters, rather than look down our nose at their weapons and methods, the while bewailing the slowness (or lack) of growth of organized shooting.

I personally have no interest in the obsolete foreign weapons available today. I prefer to spend what I can afford for my shooting hobby on getting better equipment than I already have. However, the fact remains that most of the obsolete military weapons now available at low cost have been proven by years of experience as being sound, dependable weapons of good practical accuracy. If the purchase and use of these weapons serve to awaken a real interest in shooting, a desire for better weapons and accessories will quite naturally follow, to benefit both organized shooting and the shooting supply trade. It would appear that both we shooters and the "Trade" might well look further ahead than we have been doing, to plan and work for the future as well as the present.

PHT

TRYING TO CATCH UP

Apparently unavoidable delays in printing made the November issue much too late in mailing. This issue is being cut 20% in number of pages to aid in regaining an earlier mailing date and a real effort will be made to reach an early in the month mailing date as soon as it may be possible to do so. Please have patience—we are **trying.**



Phil, the editor, extends to all of you his best wishes for the Holiday Season, the New Year and Always.

DESIRABLE CO-OPERATION

Co-operation between neighboring states in arranging tournament schedules to avoid conflicting match dates appears to be gaining ground.

Some three or four years ago the six New England state associations formed the New England Congress of State Rifle and Pistol Associations, with one of its chief objectives the scheduling of tournament dates in this compact area to avoid conflicts. While this objective may not have been fully attained yet, there is an improvement in this situation in this area where matches in any of these small states depend for success on competitors from neighboring states, or the whole area. Perhaps some failure of co-operation from clubs within states is due to lack of regular news bulletins from the state organizations in some of the states—lack of information rather than willful failure to co-operate.

According to the December "THE NEWSLETTER" of the Washington State Rifle and Pistol Association, the states of Oregon and Washington and the neighboring Canadian Province of British Columbia are informally co-operating to avoid this conflict in tournament dates

Some type of regular news service to members of state shooting organizations is very much worthwhile—an informed membership is liable to be an active and co-operative membership. An exchange of these news letters between all state associations providing them would be a very desirable thing, which could aid in co-operation with understanding throughout the nation.

PHT

POSTAL OFFHAND MATCH

The 41st annual American Smallbore Indoor Record Match, the 100 shot Scheutzen style offhand match at 50 feet on 25 count Ring targets, will be fired on the traditional dates—between January 1st and March 31st, 1959.

This is a most interesting postal match for **anyone** who likes to shoot the rifle from the offhand position, with incentive prize awards to every fifth place the full length of the ranking list.

Spencer J. Lanning, 2015 West Horne, Sioux City 3, Iowa, is the match manager, to whom requests for complete information, and entries, should be sent.

COVER PHOTO

Col. Townsend Whelen's range at his summer home near Woodstock, Vermont. The covered firing point is designed for bench rest, four position rifle, and pistol shooting. Photo shows the Colonel at his shooting bench, his grandson Townsend Bowling shooting smallbore rifle prone and a neighbor, William Peterson shooting pistol. The shed roof is slanted downward toward the targets to give fullest possible shelter from rain and sun, while providing ample head room at the rear. The position of the pistol bench is

much higher than usual, for two reasons—to permit using spotting scope without stooping, and to avoid interference with sitting and kneeling rifle practice.

LETTERS

Dear Phil:

The origin of this article ('FLIERS" on another page) may be traced directly to a carton of Remington MATCH which Al Freeland persuaded me to buy at the Black Hawk shoot last summer. Though already plagued by what I thought were fliers with Mark III, I found that the Rem. brand in my 52-C were perfectly lousy, and blew back enough fouling to bog down the firing pin after a couple of times over the course.

Before the matter was ended I had cut 6/10 of an inch off the breech end of my barrel, rethreaded, rechambered, lapped in the bolt sleeve and lapped out the lead, and incidentally enriched my knowledge of firearms.

What was the cause of all this effort now shoots so well that I want to call the Remington brand the hottest of match ammo. Now, instead of crying over 10's as I did last year, I'm crying over X's dropped. 20X, 39X, even 40X—these are getting to be commonplace on the indoor target. I do it easily, too, whereas last year, sweating like a nigger writing a letter, I was losing one every time or two over the course. I wanted to blame the rifle; but, unable to prove it, could only fear that I was slipping in my old days.

A sulphur cast showed that the chamber originally tapered from .225" to .228" in the length of the case. The new one measures .224"-.224" in the same distance. This is .001" at the mouth and .002" at the head less than dimensions for the .22 L. R. chamber given by Howe, yet it takes all Western and Remington rounds perfectly.

The diameter at the bullet end of a .22 L. R. case is .224", yet fired cases come out of the new chamber measuring from .2225" to less than .223". They came out of the original chamber measuring about .223"—also less than unfired case diameter. How come they are less?

The Bernoulli Theorem furnishes a very logical explanation. Gas that seeps back outside the case is at rest compared with the high velocity of gas moving into the bore. Hence the pressure on the outside is so much greater than pressure inside that the case is shrunk in the region of seepage. The corollary is that taper in a .22 L. R. chamber may be omitted to good advantage.

Yours very truly,
Jesse M. Grigg
5951 South Tripp Ave.
Chicago 29, Ill.

Dear Phil:

Thought your long letter on "shooting games" showed much insight into problems of why so few shooters. Actually, there are far more shooters than there are organized competitive set-ups. One reason for the increase in formal centerfire shooting is that the number of people interested in CF shooting have increased. This broadening of the base of shooters from which are drawn the organized crowd that gets into the statistical records is the importing of cheap centerfire rifles and bulk ammunition of "war surplus" origin.

I have found about one fourth of all the shooters Sundays at the Fox Valley Gun Club range are kids, under 21, shooting cheap Mausers, Mannlichers, Enfields and such stuff. Noticed one family group of two or three brothers and their father, with a bevy of Mannlicher 7.35 carbines, several refinished with recoil pads, varnished stocks, and such. They were shooting handloads and getting a great kick out of it. I asked them if they were aware that with the cheap ammo around, jacketed or even lead bullet handloads were the expensive thing. They admitted that their ammo cost them 7½¢ a round, but that they wanted to "know what they were shooting." It is from such young enthusiasts as these that future arms market and enduring enjoyment of "gun fun" will come. I wouldn't be surprised to know that many centerfire shooters with rebuilt Model 70's and other fine rifles started out on a cheap Mauser or Springfield they got through DCM or one of the arms importers.

When you shoot for group, scaling your targets is not too practical. But lately I have been doing some shooting on pop-up targets of the "punchy Pete" type and also on moving scaled targets fired over 25 feet that were scaled to man size viewed from 100 yards. (Shooting, by the way, was under "bright moonlight" conditions—very interesting.) Used a .22 rifle but 20 yard or 25 yard pistol ranges could be fired on, using scaled targets, with centerfire rifles and fast scoring done. There is really nothing wrong with the "shooting gallery" ammo burning habit if you have a sensibly worked out scoring system to reveal factors of merit and skill.

Beretta has a 20-shot smallbore clip magazine that will fit their own guns, such as the "Silver Gerfalcon" imported by Galef, and also the Walther PP models and PPK in .22 (with slight alterations anybody can do). You can trigger the Silver Gerfalcon rapidly as a machine gun. I suggest the 20-shot clip plus rapid fire contests would give valuable pre-induction training in handling a 20-shot clip fed weapon (like our new M14 is) and at the same time burn up plenty of ammo, making the cartridge firms happy. A schedule of competition using such arms would be exceedingly lively, adding spectator appeal to the contest especially if several clips were to be fired during one course of fire. The Beretta clip feeds perfectly if one takes care in loading it to keep the rims in their right positions. I found that dry, ungreased ammo worked best as the lubricated stuff picked up dirt and also left fouling on the follower, causing an occasional malfunction by failure of the follower to ride up promptly. But when clean, with Super-X or other gilding metal clean cased stuff, it worked fine. Lots of plinking fun in my PPK Walther .22, also.

In the rifle brackets, the Remington M740 or the Garand lend themselves to rapid fire contests. Cheap ammo is of course a necessity in such a contest. Recently large quantities of ammo have been destroyed by the United States government, ammo paid for by us taxpayers, which should have been given out for shooting. It is possible that the nebulous entity known as the '-firearms lobby" got Uncle to scrap such valuable merchandise. Though I do believe an investigation should be made of people authorizing such wilful waste of public property. If such ammunition were put into normal trade or DCM channels at the cut rate instead of the silly 6-7¢ a round now being charged, you would find barrels being worn out right and left, requiring new barrels, etc. Remington or Winchester would doubtless develop a custom rebarreling department, if they really want to make money in the gun business, putting new barrels on their old guns which had been worn out in just such ammo burning sprees. I call the price of 6¢ or 7¢ a round "silly' since in Switzerland, obsolete ammo is sold to shooters at from 11 centimes to 23 centimes, the smaller figure for practice shooting. That is about 3¢ each, and I see no reason why surplus government ammo should be charged to shooters at high prices.

If cheap surplus ammo and rifles sold inexpensively could be distributed all over the country, the entire firearms trade would benefit. The problems of precision shooting which now form so much of your own groups' activities would be confronted by experimentally-minded people in other forms of shooting. The more people interested in this shooting game, the better it is for us all, gun makers, gunsmiths, shooters generally, and of course we editors like to see more people reading our magazines.

I hope your thoughtful essay on shooting games will stimulate clubs into taking individual local action to set up rapid fire and fast-paced events. Those bustable bullseyes make good marks to shoot at, and you'd be astonished at how easily the dyed-in-the-wool paper puncher will flub his shots if he has to empty five shots rapidly at five spaced bustibles. At least one or two will stay up there after the smoke clears away. When he gets that good, put up more targets—it just means more ammunition—fortunately, there's plenty of cheap ammo around for the snap shooter and tin can roller, even in the centerfire calibers.

On pistol shooting, there is much to say but frankly, the "serious" competitive shooters discourage non-serious shooters from using their ranges. I resigned from one club because when I wanted to test the then-new post war .380 Walther, I was coldly informed that "We don't allow shooting jacketed ammunition on our range." Absurd, of course, since there is such ammo as 9mm Luger available in vast quantities at snap-shooting prices. "Why bother to handload?" is almost the question, although handloading will continue to be a major and highly desirable element of pistol sport. But for just blazing away, there is absolutely no place in today's shooting scene, except the commercial shooting range where any caliber can be used. This is a discouraging thing to the man who knows he isn't going to be a "medal winner," merely because his temperament drives him to enjoy shooting for its own sake, not for just winning medals. In many ways the ammo burner and the bench rester are temperamentally alike—each is striving for some wholly personal solution, not for the honor of winning medals, but rather to "find out something."

Few random thoughts late in the office at night . . . .

Cordially,
W. B. Edwards
Illinois

Mr. Teachout:

Your notation "Need more dope items on handloading, etc.," at the bottom of page 19, September Precision Shooting, prompted this. However, instead of furnishing information, my intentions as an "All gone" convert to the Bench Rest game is to venture questions of a scientific nature that in my opinion will be great help to all of us newcomers if the questions are answered by the experienced. From previous experience with the Old Hands, there is no doubt that any and all are more than willing to answer

(Continued on Page Eleven)

THE TOURNAMENT CIRCUIT
JUNIOR TOPS FIELD IN HOMESTEAD, FLORIDA, TOURNAMENT

The scene was a bright, warm, sunny day on Dr. F. P. Archer's private eight point rifle range near Homestead, Florida. The occasion was the Seventh Annual Blackhawk Small-Bore Tournament. Doc had a full house of 24 competitors, all eager to latch onto the beautiful solid bronze plaque donated by the Blackhawk Rifle Club of Chicago.

It soon became apparent that the 1958 Florida State Champion, Marty Washington, who had flown down from his studies at the University of Florida in Gainesville, was the man to watch. Marty, who is a Junior-Master competitor, tied the winner of the 50 yard any sight event (F. M. Van de Water) with a 400-33, won the any sight Dewar with a 400-31, and took another second place in the 100 yard metallic match with a 398-24 (winner Reginald Ryle with 399-21). Things looked pretty bright for Marty at this point.

Nobody was paying any particular attention to little Billy Tourch, a 15 year old Junior-Expert, coming out at the bell at 108 pounds, all 4' 10" of him. Billy's prime objective was to win one of Doc Archer's Pine Tree "400 Club" brassards to put on his jacket. Billy hadn't made the grade in the first three events even though he was knocking on the door with a couple of 399's. He was still struggling away in the last event of the day, 50 meters, metallic sights. Another near miss gave Billy his third 399 of the day and no "400 Club" brassard. However, when the chips were cleared away it turned out that little Billy (now known as the little man with the big gun) not only was first in the 50 meter event but first in the Grand Aggregate as well—1594-110 to Marty Washington's 1592-109.

Billy's equipment was a Remington 37 rifle with Mark III ammo, Redfield International metallic sights and Lyman Super-Targetspot.

(Due to an apparent increase in Florida smallbore activity of late, particularly among the newer shooters and in the Junior ranks, Dr. Archer is considering making the Eighth Annual Winter Tournament on his Pine Tree Range a two day affair on two consecutive Sundays. He is tentatively planning on Sunday, January 18, 1959 reserved for Uncl., Mks. and SS. competitors with special awards for those under 19 years of age in any of the classifications; and Sunday, January 25th reserved for all competitors having Expert or Master classifications, including Junior competitors holding these classifications. Aggregate awards would be made for each day but the Dr. Archer Grand Aggregate Trophy would be awarded the highest aggregate score fired during the two days regardless of classification. Dr. Archer feels that this plan will permit a more representative competition on his 8 firing point range, which is limited to 24 firing four 40 shot events in one day.)

Billy Toursh, 15 year-old, 4' 10", 108 lb. junior expert from Miami, gave all-comers a shellacking in a Florida smallbore rifle tournament.

MASSACHUSETTS SMALLBORE RIFLE CHAMPIONSHIPS

The 1958 Massachusetts Smallbore Rifle Championship tournament on the Springfield Sportsman's Club Range at South Monson drew a total of 95 competitors, including 26 junior shooters, most of whom competed in at least the metallic sight matches as well as the special junior event. Judging from the scores posted by shooters of known ability for the four senior events, the day must have grown into a pretty rough one for smallbore shooting.

John Crowley of Hamden, Conn., won the grand aggregate with a score of 1586-106. Kermit Montross of West Hartford, Conn., was runner-up with 1583-106 and William Rauch of Palmer, Mass., won the resident state championship with 1583 88. Tom Efford of Stratford, Conn., a junior shooter, was fourth over all and high expert with 1583-87. Six of the high seven expert scores were fired by junior shooters, all of them higher than more than half of the master class shooters.

Dana Cahoon, Boxford, Mass., won the first event, 50 yds. on metric target, with 400-35 and junior-expert Elaine Bugyi, Bridgeport, Conn., was runner-up with 400-32. Joan Cahoon and Richard Baldwin fired the only other 400's.

Crowley won the next two events, 50 yd. metallic with 400-32 (the only possible) and the metallic sight Dewar with 396-21, with Efford runner-up with 396-15.

Scores really took a tumble in the final match, 100 yards with any sights. Marksman Alexander MacEachran from Bridgeport, Conn., won with 396-15 and Dana Cahoon was runner-up with 395-12—from there the scores dropped to 393's and way, way down in all classes.

Dennis Dostie, Marlboro, Mass., won the junior match, 20 shots at 50 yards with metallic sights, with a 200-12 score.

CALIFORNIA HI-POWER LEAGUE

The Valley Shooting League November match held at Lindsay had 35 competitors. William Agee of Avenal had high score of 239-23V for the 10 standing slow fire and 10 sitting rapid fire at 200 yards, 10 slow fire sitting and 10 prone rapid fire at 300 yards, and 10 prone slow fire at 600 yards. The next four were Paul Stanley, Trona, 237-14; John Harness, Orosi, 236-12; Henry Wright, Fresno, 234 20; and Leonard Butler, Fresno, 233-15.

CALIFORNIA JUNIOR RIFLE CHAMPIONSHIPS

One hundred fifty eight juniors from all parts of the state competed in the California Junior Rifle Championship tournament at Fresno, November 9th, each shooting a 40 shot match at 50 yards and a 40 shot match at 100 yards, prone.

Two girls, Gail Cauley from Norwalk and Kristin Stal from Santa Ana, beat all-comers. Gail scored 798-46x to win the championship and Kristin posted a 797-52x for runner-up spot.

Bob Lepper, Fresno, was 3rd with 796-46; Jimmy Williams, Pasadena, 1957 Calif. open smallbore champ, 795-46 for 4th; and Daniel Dempsey, Los Angeles, 795-40. Others winning the State Team brassards were: Richard Lohr, Woodland Hills, 793-34; Russell Boates, San Anselmo, 792-39; Leroy Dunn, Santa

California hi-power match winners. Left to right: Henry C. Wright, Joe Specht, Harold Ghaner, Robert Perkins and John Welden. Ghaner is from Ceres, the other four from Fresno. Perkins and Specht were top competitors in the Los Angeles smallbore match the first of November.

Ana, 792-38; Larry Gray, Los Angeles, 791-49; Robert Bott, Oxnard, 791-40; Jerry Hendrick, Oxnard, 791-40; and William Fleming, San Gabriel, 791-33.

CALIFORNIA MID-STATE HI-POWER CHAMPIONSHIPS

With 60 competing in the sixth annual Mid-State Hi-Power Rifle Championships on the National Guard range at Mt. Campbell, near Reedley, Calif., Nov. 16th, the Fresno Rifle Club won the team match and took four of the top five individual places.

Henry Wright made top individual score of 242-24V for the course of 10 standing slow fire and 10 prone rapid fire at 200 yards; and 10 prone and 10 sitting slow fire and 10 prone rapid fire at 300 yards. His Fresno team-mates Joe Specht fired 238-19 for 2nd place, Robert Perkins 237-14 for 4th and John Weldon 237-13 for 5th. Harold Ghana, Cered, Calif., fired 238-14 for 3rd spot.

Wright and Perkins shot rifles with 28" Bliss Titus barrels on Springfield '03 actions with Wright-Allen triggers and custom stocks, with load of Sierra 125 grain bullets, 53½ grains 4895 powder and Western 8½ primers. Others of the top five shot Model 70 Winchester target rifles.

PRECISION BULLET CASTING

(First of a Series)

By Kent Bellah

The cost of cast bullets is so low that we members of the Hull Fillers & Cap Busters Association, Unlimited, can afford to enjoy the finest hobby on earth to our heart's content. Entirely too many people consider cast bullets a second rate product, made only as a substitute for something better. Maybe they won't win any serious bench competition, but they are entirely practical for most hunting, plinking and targets. Good bullets can be made that do the job well, often far superior to factory loads. Dedicated handgunners consume lead in fantastitc quantities, and riflemen would do well to get on the gravy train pronto.

Frankly, I'm a Hi-V fan who believes in plenty of velocity with reasonable bullet weight for the job. And I'm an ardent varminter. At the same time I'm aware that factory ballistics can be exceeded with cast bullets in the 30-30 case, which isn't the bad reloading number some shooters think. More than half the medium game shot in this country could be bagged cleanly with such loads, in the right hands.

The major cause of inferior cast pills is inferior casting equipment. Those who consider any poured bullet "good enough" will disagree. Okay. Let 'em stay with the ancient dip pot grandpappy used. It served his purpose well in days gone by, and some good bullets have been made by that method. The Theromostat Controlled SAECO Electric Furnace is without equal or competition for precision bullets. The convenience and speed have little appeal to occasional users. But it helps make better, more uniform bullets. It's a must.

No one can control heat within 20 degrees for uniform bullet density and hardness. Excess heat changes the composition of your alloy from bullet to bullet, or from batch to batch. Such beautiful, well filled out bullets won't shoot as well as they look. Alloys should be carefully mixed, in batches as large as possible. Ternary alloys are more difficult to mix with uniformity, and much more difficult to duplicate. That is why I recommend a lead-tin mix for home-brewers. Factory alloys that include antimony are entirely satisfactory, if correctly made. As with any product, some factory alloys are better than others. Scrap lead of known quality can be used, and I've used it by the ton. Alloys will be discussed in a future article. The first essential is proper equipment.

In addition to exactly controlled heat, the SAECO furnace has a heavier head of metal than a dipper. Combined with the bottom draw feature, your bullets will be better filled out inside and out. Internal defects are a major cause of flyers, or misses on game. Bullets sorted by weight may have internal defects that are far more important than a minor weight variation. A considerable weight variation gives better accuracy than an out of balance bullet. The SAECO does much to eliminate internal defects, such as air pockets, slag, etc.

The stainless steel enclosed tubular element in recent models should be practically permanent. Mine has consumed tons of metal. The 11 pound capacity is large enough for alloying metal, that is cast in 1 pound pigs in the four ingot mould included. SAECO's new 20 pound capacity "Utility" Electric Furnace is excellent for this use. Many shooters use it as an electric dip pot, a job it does well, but I can't recommend any dip pot for real precision bullets. However, I've used it to alloy some 50 pounds of metal per hour, and for this job it's tip top.

I don't favor casting small runs. Uniformity is better after casting 50 or 100 bullets. I've seen Ralph Sisk discard 50 swaged Sisk bullets to "warm the dies," and warming a mould is far more important. (Have you noticed that Sisk puts 102 bullets in each box?) I also think the metal temperature should be as low as possible to make bullets perfectly filled out, with the metal flowing freely. The actual temperature setting may vary as much as 100 degrees from winter to summer. About 725° is a good starting point, and a bit higher with hollow points. Low temperature causes poor noses.

Many good bullets are ruined in sizing. If your new or used sizer is a shaky, loose jointed contraption, bullets are forced in a die out of alignment. They won't group well, no matter how carefully they are loaded. Some sizers cut one side of the bullets more than the other, often enough to be visible to the naked eye. Handbooks have stated that sizing "trues up a bullet," when the truth is they are sometimes ruined, and good only to melt down.

Leading and other woes can be caused by rough sizer dies, another major cause of trouble. Dies should be mirror polished, as well as in precision alignment in the tool frame. Check your bullets under a 3X glass. Is the bearing surface dull, with tool marks all around? If so, your dies should be used for a trot line sinker. Hot powder gas blows ahead of the bullet under high pressure and melts off tiny particles of alloy. Leading will accumulate in the bore or forcing cone, where it builds up in varying amounts to ruin accuracy. A mirror bearing surface gives better accuracy, less leading and less friction. Crude bullets make crude ammo. Good handloads are superior to factory fodder, but some of us assemble ammo that Winchester and Remington would definitely reject.

The new SAECO Lubri-Sizer is the best I've ever used. It sizes perfectly in line, with the ground rods in close alignment. It will not ruin good bullets. Dies have beautiful workmanship. A "Go" plug enters easily while the .0003" larger "No-Go" portion stops like it hit a brick wall. Same precision with external snap gages. Bullets are sized concentric and in alignment, with a high mirror finish. It looks like chrome plating. At 4 feet with my naked eye I can identify bullets sized in a Lubri-Sizer with those from my other three machines! When fired bullets are recovered undeformed, they don't look like Pisa's leaning tower, indicating they entered and left the bore in a straight line. This is precision accuracy.

Other features include a spring loaded tube to lube some 15 to 50 bullets be-

(Continued on Page Thirteen)

FLIERS

By Jesse M. Grigg

WHAT follows is an attempt to show that the accuracy of a .22 rifle is dependent upon a mutual relation between the fit of the locking mechanism and the fit of the case in the chamber. It depends on this relation because the direction of recoil is determined by their combined effects. The relation is mutual because the sum of their recoil opposing forces is constant and equal to the backward thrust of the propellant gas. As the effects of these forces are different, the rifle will swing in a different direction if the relation varies.

The energy of the propellant cannot impart motion to the bullet without imparting motion to the rifle. Motion to the rifle is communicated in two ways: (1) by friction drag of the cartridge case on the chamber wall; (2) by force transmitted through the bolt and locking lugs. As the center of gravity lies outside the line of action of both forces, the recoil consists of both backward and angular motion.

The plane and direction of the angular motion depends on the place in the rifle where force is applied. As the case drag is concentric with the bore axis, that is where its place is, and that is its direction. On the locking mechanism the direction of the force coincides with the bore axis only if the bolt does not sideslip during recoil. In event of slippage, the moving part is momentarily a free body, and the absence of one force reaction permits another force to be exerted in a direction other than that of the bore axis, this changing the angle of the rifle to the detriment of accuracy. Further, as bolt resistance plus case drag equals the total backward thrust of the propellant, the disturbance will be small as the case drag is large. Thus accuracy is dependent on both the fit of the case and the fit of the locking mechanism.

In what follows the mathematical aspect is touched only briefly. However, enough of other explanation is given to make the argument apparent to the non-mathematical reader. The argument itself is greatly simplified by assuming that the center of gravity of the rifle lies on the bore axis, an assumption which is not true, but which serves the purpose here with little error. Further, as the type of flier to which it refers depends on irregularity or imperfection of fit in the locking surfaces, it is predicated on the assumption of such irregularity.

In the usual design of the .22 bolt action match rifle, the 52 for example, there are two locking lugs whose resistances are transmitted to the shoulder of the bolt by a sleeve which turns on the bolt spindle. As the bolt sleeve is purposely loose on the spindle, the effect is a three-point bearing, such as is illustrated in Fig. 1. Points 1 and 2, nearly diametrically opposite, are the contacts made by the locking lugs. The third point 3 is the contact, assumed to be haphazard, which the forward end of the bolt sleeve manages to find on the shoulder of the bolt.

If the locking assembly is not hardened to obviate headspace change, normal use may soon wear the surfaces between bolt sleeve and shoulder until they bear uniformly all around instead of at one single point. If this has already occurred, then the faults which are the subject of this discussion are mostly non-existent. However, if the parts are hardened to obviate wear, then possibly the rifle may be used some time before sleeve and shoulder surfaces fit all the way around. Until this time arrives the locking bearing is truly three-point; its resultant being off-center, recoil thrust will move the bolt body sidewise if side play of the bolt and looseness of the chamber permit, and the rifle will be inaccurate for reasons stated above.

The pertinent forces and dimensions are denoted in Fig. 1. C. G. is the center of gravity assumed to lie on the bore axis; x is the distance from C. G. to the bolt face; and b is the distance, measured parallel to the bolt axis, from the bolt face to the bolt shoulder. The bearing place on the shoulder is denoted by 3, while z is the radial distance from it to the nearest point in the bolt axis (same as bore axis). Bearing 3 being off-center, a is the angle at which the force F on the bolt face is transmitted through the bolt; 4 and 5 are the places where the lateral thrusts (due to 3 being off-center) are exerted on the inside receiver wall.

G denotes the backward push on the chamber wall due to adhesion of the expanded case. F is the remaining force exerted on the bolt face. The sum F plus G equals P, the total backward thrust of the propellant gas. In equation form this is

$$(1)\quad P = F + G$$

which shows, for any particular value of P, that F rises if G falls.

Fig. 3 is the diagram of forces. The sum of force F which is transmitted through the locking lugs, plus G which is transmitted through the chamber wall, is the source of all recoil while the bullet is in the bore.

Through the bolt body force F is transmitted to 3 at the angle a. The axis of F (and G) passes through the center of gravity C. G., this insuring the absence of turning moment as long as the parts of the locking mechanism do not slide over one another at the time of firing.

For showing later what may happen if the parts do slide, the canceling components of turning moment are detailed as follows. Vectors 1 and 3 about C. G. are respectively $Fz\cos^2 a$ and Fx sin a cos a, both clockwise. The turning moment of vector 2 about C. G. is $-(b+x)$ sin a cos a, counterclockwise. The resultant equals the sum of all three. Thus after replacing sin a by its equivalent (z/b) cos a in Fig. 3, and then adding we have

$$(2)\quad M = Fz\cos^2 a - Fz\cos^2 a - \frac{Fxz}{b}\cos^2 a + \frac{Fxz}{b}\cos^2 a .$$

Here for each positive term there is seen to be a corresponding equal negative term. Thus as C. G. has been assumed to lie in the bore axis the angular motion about it is zero unless something happens to destroy the moments which correspond to one or more terms.

Either plus or minus Fz cos square a is annulled merely by shoulder pressure on the buttplate causing the place of it instead of C. G. to be the center of rotation. Also active turning moment in one direction is created by absence of lateral pressure at the points 4 or 5, or absence of longitudinal pressure at point 2. Thus if the bolt has freedom to move, say laterally, no pressure is exerted on the receiver at one end until the gap is closed. In this interval the force of acceleration supplies the reaction to one force component of F, and one moment is canceled due to lack of pressure on the receiver wall itself. If the rear end of the bolt is where the sideslip occurs terms 2 and 3 in Eq. (2) are momentarily annulled; if

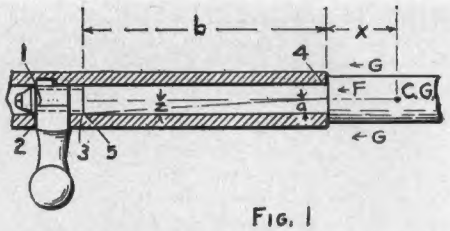


FIG. 1

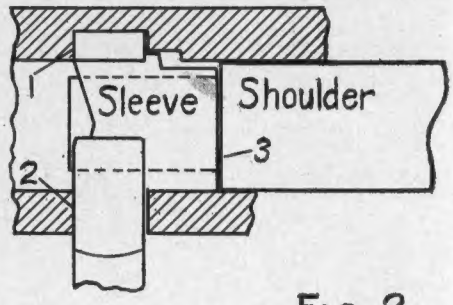


FIG. 2

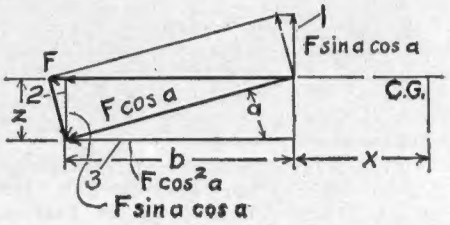


FIG. 3

it occurs at the forward end the moment of the fourth term is the one which is affected.

Now while the bolt is sideslipping it is acquiring kinetic energy which is imparted to the receiver wall when the motion is arrested. As the lateral freedom is only a few thousandths at most, the energy imparted is scarcely enough to disturb the rifle, though it is enough to yield a distinctly audible click, which registers like the sound of solid metal being struck wth a light hammer.

The annullment of one or more components of the torque is what does the damage. The numerical values of them in Eq. (2) are by no means small because the bullet in the bore may have acquired a velocity of several hundred feet per second while the sideslip gap is being closed. In fact most of the internal recoil of the rifle occurs during the first few inches of bullet travel. At the muzzle of a heavy barrel match rifle the total angular change, including bending of the barrel itself, may equal about 1.25 minutes while the bullet is in the bore. The distance z may equal about one-half the distance at which the real center of gravity is situated below the bore axis. Thus the deviation due to sideslip may vary from one-fourth to one-half a minute, depending on which end of the bolt has freedom of lateral movement; or if only one locking lug is in contact before the rifle is fired, the flier may go as wide as a minute of angle.

The occurrence of sideslip depends largely on the failure of the bolt sleeve to contact the shoulder all around its periphery, and of course it depends on freedom of the bolt body to move sidewise. Also, as lubrication greatly diminishes the coefficient of sliding friction, sideslip is more likely to occur when the surfaces here are well lubricated.

The amount of the resulting angular throw, when sideslip occurs, is proportional to the force on the bolt face, which is F in Eq. (2). In this equation F may

be replaced from Eq. (1) by P - G. Thus it is seen again that accuracy depends on both the degree of fit in the locking mechanism and the degree of adhesion between the case and the chamber wall.

The area of the cylindrical wall of a .22 case equals several times the area of the head. If the case were a perfect fit and the brass very soft the force G with which it adhered to the chamber wall would equal about four times the thrust F on the bolt face. In practice the ratio is less even than 1 because the case must be stretched before it begins to adhere. Nevertheless, as the allowable adhesion is limited only by the strength of the brass, it is obvious that the faults of imperfect fit in the vital surfaces of the bolt assembly may be mitigated to extent that adhesion between brass and chamber wall may be increased.

Among the factors which control the adhesion of the case are lubrication, chamber size, and temper of the brass. Oil on the case apparently is a small factor insofar as the .22 L. R. is concerned. The bad effects of an oversize chamber are far more serious, and the harder the brass the more serious they are. If the brass is too hard and the chamber too large, gas flows back along the outside, and the case may not be fully stretched, as is evinced by burned spots or exterior fouling. This author has found the current Remington match ammunition, because of its hard brass, to be hopelessly inaccurate in an oversize chamber when the bolt has sideplay, though it proves extremely accurate in another rifle which lacks these mechanical faults. In a test for hardness, it is found that the weight which will barely press a .22 Remington case out of round will flatten halfway down the cases of Win.-Western loading.

The looser the fit of the case, the more important is the need of a snugly fitted bolt. Most important of all is contact all around between sleeve end and bolt shoulder. If this condition obtains, the force on the bolt face is communicated to the rifle in the direction of the bore axis, and such faults as sideslipping and lack of case adhesion are largely neutralized.

Unless the locking mechanism is otherwise at fault, the ideal of uniform contact all around will be attained by wear, a longer time of course being required if the surfaces have been hardened, or if they are lubricated. Fit of hardened surfaces may be hastened by spotting and lapping with oil and fine emery. However, as this increases headspace, the job should be done, if at all, either at time of a barrel fitting job, or else when a new bolt handle is provided to correct the headspace. The lapping should be done with the assembled bolt in the receiver, striker cocked, and with movement of the bolt handle to and fro in a small arc near the bolt closed position. Possibly the removal of only .0002" of metal will improve the accuracy, but do not tackle the job unless you are an experienced metal worker. Be patient in the knowledge that the parts wear too loose too soon anyway.

But even a close chamber and nicely fitted locking surfaces are not sure-fire protection against fliers. Sometimes a bit of foreign matter may intrude between the surfaces. Possibly this is what has happened when a rifle shoots a 10x on one bull and throws a wide one on the next. Another thing that can upset the sequence of uniformity is failure of the forward end of the bolt to find its wonted position. The most likely cause of this is foreign matter being shifted around in one of the extractor recesses. It may be a bit of grass blade or a weed seed; and more than once cotton fibers have been known to be carried there from the Hoppe's jar now favored by many match shooters. In less than one day's shooting in sandy or dusty locations an extractor recess may become plugged with enough debris to cause a flier. So it is not enough to own a good rifle. By keeping it free of foreign matter one should give it a chance to do its part.

In some makes of rifles still another type of fault may be present and make trouble for months before the cause is found. This is dragging of the bolt handle on one side of the slot in the wood which is provided for it. Depending on which side the drag occurs, pressure on its seat of one locking lug is lightened until firing may cause it to seat with an audible, metallic click. Variation of the pressure of the wood fibers with heat, moisture, and thickness of the cartridge head may cause the impact point to change. So it is suggested that the reader check for clearance, **front** and **rear** between bolt handle and wood if a slot is provided here. If a piece of paper cannot be withdrawn, the notch should be widened on that side.

In a few words the substance of all the foregoing is this. For absence of the kind of fliers to which it refers, the requisite of a close fit of the case in the chamber ranks first in importance. If the case does not fit closely, then it is required that the bolt body lack freedom of lateral play in the receiver tube. If lateral play does exist, then sideslip and resulting inaccuracy may be precluded, maybe by lack of lubrication, but mainly by existence of a uniform bearing all around the bolt sleeve when both locking lugs are firmly seated.

PLEASED WITH REVOLVER BULLET MOLD

Dear Phil:

Just tried out some bullets from my new Hensley & Gibbs .38 mold that Joe Rivers got for me. At 50 yards got me a nice 93, with two eights which I called. Used 2.8 grains Bullseye.

If you knew how I have sweated and studied to get a decent fifty yard load—weighing bullets, selecting bullets, trying half a dozen different loads, two different powders—and never getting a consistent result—well, if you knew that, you would understand how pleased I am to be able to call my shots at fifty yards, with no unaccountable flyers, and every bullet going in clean and round, not tipped over and wobbling.

I have had the same result from my .45 mold by the same people, which is why I ordered the present one. In fact, up to now I have been playing with the idea of using my .45 S & W for all center fire shooting. But with the new bullet I will get the same dependability and the advantage of the lighter loaded .38.

If those people had advertised maybe I would have arrived at this happy state of affairs long ago. They should tell shooters how the bullets drop out of the mold without any need for pounding or clubbing them out, the way I have had to do up to now. And how they come out with beautiful square bases, clean and sharp. And another thing; the directions they send along with each mold are as good as the mold—clearer and easier to understand than all the books I have ever read, and with points that the other fellows miss.

Yours,
William E. Peterson

SHOOTING RULES INDEFINITIVE

In regard to the white-elephant rifle I developed; as so often the case, it was found that the idea was, after all, not original with me.

On the one hand, I thought the NRA rules poorly written, with the resultant curiosity to see how they might be applied to unusual situations. Thus, the rules for all four positions state that the rifle must be supported by "both hands and one shoulder only." Whereas, in actual fact, as is well known, one's cheek furnishes an important support—and perhaps other parts of the body, such as chest and forearms.

On the other hand, I don't hold very well, offhand. To the extent that this is true of a shooter, I think he tends to snap, rather than squeeze. Assuming this, it follows that the greater the inertia of the rifle, the less disturbance in aim will occur during snapping. So I took my old 52 (has heavy barrel by Hubalek and a heavy stock, weighs about 12 lbs.) and fitted steel weights under the barrel, ahead of and attached to the forearm. Then fitted a metal buttplate with a 'hook' fitting **over** the shoulder (not

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National Bench Rest Shooters Association, Inc.

NBRSA OFFICERS AND DIRECTORS FOR 1959

EASTERN REGION:
Irven M. Mohnkern (President)
232 So. Patterson
State College, Pa.
Paul O. Gottschall (Vice Pres.)
R. D. 4
Salem, Ohio
Robert W. Hart
300 West Fourth St.
Nescopeck, Pa.

MID-CONTINENT REGION:
H. W. Barton
1841 South Chautauqua
Wichita 16, Kansas

NORTH CENTRAL REGION:
Walt C. Siewert
Box 749
Custer, South Dakota

GULF COAST REGION:
Coleman B. Brown
602 Sorrell St.
Corpus Christi, Texas

NORTHWEST REGION:
Dr. Rod Janson
606 West Galer
Seattle 99, Washington

SOUTHWEST REGION:
(Director vacancy)

Secretary-Treasurer
P. H. Teachout
64 Depot Street
Lyndonville, Vt.

NBRSA MEMMBERSHIP DUES:

Individual annual dues $5.00 (includes magazine subscription for membership term). Associate member (wife or husband, son or daughter under 18 years of age, of member in good standing—no magazine) $2.50. Life membership (after January 1, 1959) $75.00. Annual club affiliation fee $10.00.

RECORD MAKING EQUIPMENT

Harold Zeiser, Nescopeck, Pa., has sent the complete data on the equipment he used in making the new record 5-shot group at Johnstown, New York, at the Labor Day Shoot there.

The rifle was a Hart barrel, 29 inches long, 1¼ inch diameter, with 1 in 14 inch twist, chambered for the .222 Remington case and fitted to a Remington 722 action with Canjar set-trigger, gunsmithed by Clyde Hart. Zeiser made his own stock. Complete gun weighs 18 pounds. He used a 20X Unertl scope.

His load was 21 grains 4198 powder with 50 grain home-made bullet in B & A dies.

The shooting was done with a loose sand bag for rear rest and an adjustable pedestal for front rest. The rifle was held tight.

Harold Zeiser now holds the national record for 5-shot group at both 100 and 200 yards. He mentioned at the Johnstown shoot that he and his shooting partner, Bob Hart, consistently make tiny one-hole groups at 100 yards in their practice and test shooting under evening-calm conditions (and they do a lot of this practice shooting). If their guns fail to deliver this quality of accuracy they immediately start checking and searching for the reason they do not, and make the necessary corrections.

ATTENTION OF EASTERN REGION MEMBERS

The Winter Planning Meeting of the Eastern Region, NBRSA, Inc., will be held at Mark Twain Hotel in Elmira, New York on Friday and Saturday, February 14th and 15th, 1959.

All NBRSA members residing in the Eastern Region are urged to attend this meeting if it is possible for them to do so. It is especially important that all affiliated clubs planning to conduct registered shoots during the 1959 season send a representative to this meeting, since the 1959 registered shoot program for all the Eastern Region will be arranged at this meeting.

It might be well for shoot sponsoring clubs in other regions bordering the Eastern, who draw competitors from the neighboring area of the Eastern Region, to advise Deputy Director Paul O. Gottschall, R. D. 4, Salem, Ohio, of their planned shoot dates in 1959 in order that consideration may be given while planning the Eastern Region program.

Mark this meeting date on your calendar—no individual notices will be mailed.

ANOTHER CALIFORNIA B. R. RANGE

After a search of nearly two years for the site for a bench rest rifle range, with one disappointment after another, NBRSA members in the San Francisco "Bay Area" have now solved their problem rather simply. They have become members of the established Richmond Rod & Gun Club, which club will now add bench rest rifle shooting to its activity program, with facilities for shooting on the ranges of its own property.

The bench rest boys are now shooting on their home grounds, are having an informal shoot in December and are tentatively planning for an open competition in January. Jack Sweany, E. P. Hinkle and George Fullmer have been leading spirits in the promotion for bench rest shooting in the "Bay Area."

Anyone interested in the bench rest shooting at Richmond may contact either John B. Sweany, 187-A Silverado Trail, Calistoga, Calif. or Wally Lyford at Richmond Rod & Gun Club, P. O. Box 1575, Richmond, Calif.

NOTES ON TARGET TELESCOPE SIGHTS
by F. L. MAGOON

There are some problems in connection with Target Telescopes that I believe would be worthy of some discussion in Precision Shooting.

It seems that many of the Target Scopes do not return to the same position after each shot definitely causing the groups to spread. In some cases a condition arises where the rifle will shoot two distinct groups in the course of ten shots. This seems to happen after the rifle barrel is well warmed up from firing. In some cases the groups continue to get larger as the barrel heats. I have been conducting some tests that rather definitely establish the fact that the scope is at fault in many instances. It seems that the aluminum alloy material used in the mount absorbs heat very rapidly and in firing when the weather is warm the front mount apparently reaches barrel temperature and when this occurs the sleeve that holds tension on the scope starts malfunctioning. I have conducted some tests using two scopes. I find that before the front mount gets hot the rifle will shoot small groups, but as the rifle heats the groups continue to spread. A quick change to a cool scope will bring the groups back to the size that was fired before the heating started. I have tried this many times with the same result. The two scopes used were of the same make. My tests have not been confined to one rifle. We have one bench rest rifle here that is outstanding as compared to the others. It is equipped with a different make of scope than the others used around here. This particular rifle does not shoot larger groups when the barrel gets hot when the regular scope is used. I have tried this rifle with three scopes, the one regularly used and both of my scopes. The rifle will shoot small groups with either of my scopes until the barrel starts to heat and as the scope mounts get warm as is the case of either of my scopes, the groups start to spread. A change back to the scope regularly used will bring the small groups back again. I believe that this experience well establishes the fact that the scope mounts are at fault. Incidentally, the scopes that are causing the trouble cost considerable more than the one that is not giving trouble.

A close comparison of the scopes that are causing trouble and the one that is not, reveals the following; the scope that is not causing trouble is much lighter in weight than the others. The sleeve in the front mount that straddles the rail on the scope and holds tension on the scope, is a good fit. With the scope in place there is no noticeable rotating

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CHARLES HART, SR.

Charles Hart, Sr. of LaFayette, New York, died suddenly from a heart attack the latter part of October. The ready smile and friendly greeting of this pleasant, enthusiastic and very capable shooter and fine sportsman will be sorely missed by a host of bench rest competitors.

He leaves a shooting line to carry on; sons, Clyde Hart the barrelmaker and Bob Hart, NBRSA Deputy Director, and grandsons Charles, Jr., Paul and Wallace Hart.

FRANCIS S. YENOWINE

NBRSA member Francis S. Yenowine of Terre Haute, Indiana, died on December 2nd. Mr. Yenowine had not been in good health for several months and had found it necessary to cancel two bench rest matches on his Locust Grove Rifle Range in Terre Haute which had been scheduled for the 1958 season.

Like many another bench rest shooter, Mr. Yenowine's search for better rifle accuracy for varmint shooting led him into competitive bench rest shooting. In 1955 he built his Locust Grove Rifle Range in a second-growth woodland near Terre Haute which soon became quite famous as a wind-free 100 yard range and several 100 yard National Records were made in matches there, one of which (10 shot group at 100 yards made in 1956) still stands.

Mr. Yenowine will be remembered by many competitors at the Johnstown, N. Y. and DuBois, Pa. matches as the competitor who had the unusual, many colored, laminated stocks on his rifles. Woodworking and laminating exotic woods was another of Mr. Yenowine's hobbies. In workaday life, he managed a large trucking concern in Terre Haute.

We have lost another fine sportsman and promoter of bench rest shooting.

Dear Phil:

Here we are at turkey eating time and most of the turkey shoots and deer hunts over with. I am looking forward, however, to a few days at deer in New Hampshire in an area that I have always found very pleasant to hunt. It's that section of the country that I fell into the brook, as I described to you two years ago, but I'll try to do better this year.

There's an old saying that the older bucks get that way because they take advantage of the mistakes they make and guard against repeating them, and I guess I'll have to take a lesson from those four footed critters and do likewise.

You better not decide so early that you can't take part in the first annual Benchresters Buckshooting Bust. I have had a lot of fellows write or speak to me from time to time about hunting in Maine and I propose to give them a chance to try it if they are so minded next year.

Dr. Garcelon and I took time off from our November hunting to look into a lot of likely places and we have, at this moment, one very interesting one in mind. Its' almost at the Canadian border and is on the site of one of the most exclusive old hunting clubs—a club which, as a matter of fact, was started in 1901 by a number of millionaires who enjoy the Maine woods enough to build there 16 cabins and a central dining and club room. There are some 30 miles of private gravel roads chained off from the public. The club petered out pretty much as such as wealthy old gentlemen passed away or acquired other interests but the 50 year old lease on the entire township held until 1951. When it expired and was not renewed by the lumber company which owned the real estate, the property several years ago was sold to a wealthy Canadian lumber dealer who has recently started to cut it and has spent a great deal of money in renovating the camps and in establishing a focal point for hunters, nature lovers and fishermen. This is the first year that it was open to the public and the bench resters will have an opportunity to get in on the ground floor of what might be a very interesting annual get-together.

We, of course, will invite our other shooter friends and while they are up there, subject them to enough bench rest chatter to win them over to our game. It's going to be a nice place for the gals to go and quite comfortable for all concerned since there is electricity, running water, real beds and a fire attendant who keeps the stoves running by visiting them all every two or three hours. The cost with meals will be no higher than the cost of the average motel for sleeping accommodations only, and there will be some cabins with housekeeping facilities that will be available at less than half a saw buck. As a matter of fact, some fellows who would want to come and rough it even more, might find a place to set up their sleeping bags and get along for even less.

Demonstrating the rifle testing cradle developed by the U. S. Army Advanced Marksmanship Unit for testing the accuracy of the Unit's match weapons. (U. S. Army photo)

We'll keep you posted but what Dr. Garcelon and I need to know right off is just how many folks are even mildly interested. We want to welcome everybody and although there may not be enough deer in that leased property to send everybody home with one, it's within easy reach by good roads in less than an hour to many other famous hunting areas along the northern end of the Benedict Arnold Trail. It's a section of country which Kenneth Roberts described in considerable detail in his interesting book "Arundle."

The French-English dictionary might be handy if you want to talk to the employees in other departments other than the liquor department, but those poor folks won't be able to get anything that will help them understand the constant chatter of a bench rest shooting gang. As a matter of fact, the local hunters and guides will probably join in with the French folk and come to the firm conclusion that we are a bunch of crazy people.

I have been so busy hunting, Phil, that I haven't heard much in the way of news about bench rest shooting and I haven't yet started to make any Winter tests of my own.

I am convinced that this is a good period of the year to work on other fellows who might be interested in joining us. Just a few more members brought in by every present member, would really make our organization a strong one, I am convinced through my travels among various shooters that there are a number of fellows who are just on the verge of joining our game and need a little careful encouragement from we who like it so well and want to see it grow.

In the hopes that this column might appear in an issue reaching the hands of the shooters before Christmas, I want to express along with my own, the very cordial good wishes of Merrie Stuhlschuter and good old Jock. The friendships which we have made are cherished above all others and long may they last. May you all have good holidays and get off on the 1st minute of the new year on a coming year of good health and good shooting.

Cordially yours,

Ernest Stuhlschuter

A GREATER NUMBER of people will be engaged in organized target shooting during the next few months (on the indoor gallery ranges) than at any other period in the year. Most outdoor competitive shooters continue shooting on the gallery ranges during the winter to keep in training and practice, and because they like to shoot. Many others, however, do gallery shooting during the winter months who do not do any outdoor target shooting, and account for the greater number of gallery shooters over outdoor shooters. It is good practice and it is good fun.

A BIG RANGE is not absolutely essential for holding good gallery shooting tournaments. One of the most popular gallery tournaments in the Great Lakes Region, serving a large number of competitors with an attractive shooting program, has been conducted for years on a **four** firing point range.

Notes On Target Telescope Sights

(Continued from Page Eight)

movement of the scope tube. The optics of this scope however are not as good as the other scopes. In the case of the scopes that are giving trouble I find the following; The sleeve referred to above is a very tight fit in the body of the front mount and a very sloppy fit on the guide rail of the scope tube. With the scope mounted in place on the rifle there is a very noticeable rotating movement of the scope that is permitted by the sloppy fit of the sleeve to the guide rail. This movement is enough to show a movement of the cross hairs on the target at 100 yards of about ¼".

It would appear that as the front scope mount heats the metal expands and the sleeve starts sticking to some extent. This together with the sloppy fit of the sleeve to the guide rail could very readily be the cause of the shifting point of impact of the bullet.

I believe that there should be some design changes in the front mounts for target scopes. First, the guide rail on the scopes does not appear to be a precision machined job. In many cases waves and other irregularities are apparent to the eye. Second, the square rail with a square slot milled in the sleeve, supposedly to fit, is a very poor design, with no arrangement to compensate for wear nor to assure that the scope will return to the same position after the movement incident to recoil. Good mechanical practice would dictate that the guide rail on the scope tube be of a V design, precision machined with a corresponding V slot of groove milled in the sleeve probably of a rounded design to assure uniform points of contact at all times regardless of changes in elevation etc. by adjustments in the rear mount.

It is true that our present design with one exception, has been in vogue for a long time and I expect with few complaints. Before the advent of Bench Rest Shooting there was probably little opportunity for anyone to check the results of scope mounts malfunctioning. I also believe that today many Bench Rest Shooters are critical of the barrels on their rifles, loads, bullets etc. while their scope is the cause of poor grouping.

Another mechanical factor is the matter of a steel sleeve supposedly with a no clearance fit, working in aluminum alloy with a much higher expansion rate than the steel sleeve is something that could no doubt cause trouble at times.

I do not want to leave the impression that I mean to be critical of any individual scope manufacturer. I do hope a move might be started that would finally result in the elimination of faults that are inherent in the design of our conventional type target scope mounts.

I believe that the Bench Rest Shooters can justly take credit for the great advances that have been made during the last several years in most everything pertaining to accurate shooting. I can recall some agitation started several years ago through the columns of the Shooters News, for better barrels and there were some articles that really laid the facts on the line with photographic evidence. That agitation certainly produced some fine results as is evidenced by the fine barrels available today. I can recall the agitation for better bullets and we certainly have them today. Many other items have been improved and others made available that are infinitely better than anything we had in the past.

I believe that many shooters will agree with me in saying that a definite need for improvement in target scope mounts is indicated.

HELP THE BEGINNER

When two or more bench rest shooters get together the talk very soon turns to shooting and, if opportunity permits, frequently extends into the wee-small hours of the night. Time permitting, these talk sessions usually cover a wide information (and 'opinion') field—new or unusual equipment, rifle tune-up and maintenance, ammo loading, shooting technique experiences and observations. In the case of top shooters and experimenters, these talk-sessions cover information that would be valuable beyond words to beginner shooters, as well as shooters of some experience who for one reason or another are unable to personally meet other shooters and take part in similar exchanges of information.

We have never yet observed an experienced shooter refuse to give information to another **who asked for it**—other than to admit that he did not know, if that happened to be the case.

Many beginners and no few NBRSA members who do a considerable amount of shooting and experimenting on home ranges are for some reason unable to attend shoots or other gatherings of shooters. Many of these members are pretty much limited to **published** information. They begin by expecting (and rightly) such information to be published in the NBRSA official publication. Probably after a bit they just **hope** for that published information. Quite frankly, these members have been and are being very badly short-changed from lack of helpful information published in their organization publication.

The NBRSA secretary and editor is no "EXPERT" in any branch of rifle shooting. He is no Simon-pure benchrester, but has an active interest in all types of rifle shooting, both organized competitive and field shooting—jack-of-all-shooting and not very good at any type. When it comes to shooting information, especially bench rest, he's a better catcher than a pitcher.

It is you NBRSA members with demonstrated ability and experience who can supply the information that will help other members get more satisfaction from their own shooting, and thus help the NBRSA become a **BETTER** organization. If the NBRSA becomes a **BETTER** organization for all its members, it naturally follows that it will become a bigger organization.

There's the situation. What will you do about it? PHT

Letters

(Continued from Page Three)

any question, provided, of course, the question is asked. Mr. M. H. Walker's answers in Precision Shooting certainly have been a valuable source of information, and perhaps Mr. Walker has an answer for all of the following, but I think it would be interesting to get a cross section of answers on some of the questions.

First, is the ether, that seems to be in all salvaged powders, an addative or was it put there during the manufacture of the powder? What effect will time have on this powder as the ether evaporates? Just what was the ether put in the powder for—what purpose does it serve? All salvage powders that I have used leave a black tarish residue in the case and the bore, not like the white clean crisp residue of most canister powders. Strangely enough, some of these salvage powders give amazing accuracy, though, after a couple of shots, one can hardly see through the bore. The only way I have been able to get the bore clean, after using salvage powder, is with a wire brush and gasoline. (Try it and you are on your own.) What price can one expect to pay, in barrel life, for using salvage powder?

It is expected that a book could be written on "Bullet Pull" and related phenomenon—you see it mentioned but never fully explained. Now, and I think this is prying deep down in the Old Boy's bag of tricks, how's about something on case neck fit in the chamber, not the conventional run of mill stuff, but the technique used by the "Top Twenty." In reloading, is the outside of the case neck sized at all, or is the inside diameter worked for a perfect bullet fit—what is this bullet to case neck fit? Now, we go to great pains to make a bullet sized to the exact "Tenth," surely we do not squeeze this perfect bullet down a half-thousandth or so by cramming it in a tight case neck—yes sir, it can be done. Assuming we have a perfect round chambered in the barrel, the trigger is pulled and "Whammy" some 40 to 50 thousand psi spanks that pretty little bullet in the butt! That same little bullet that was so carefully assembled and then cherished as if it was something sacred! What is the theory, other than the initial pressure on the bullet base, concerning this pressure of combustion that surrounds the bullet at the instant before it is squeezed down the barrel? Would not this pressure tend to compress the bullet diameter before it ever entered the barrel? Perhaps this pressure surrounding the bullet helps offset the pressure on the base that is trying to upset the bullet base. On the other hand, if the case neck is a real close fit to the chamber neck, and the bullet a perfect fit to the case neck, whereby the bullet base upset would be the very minimum as the bullet started out, but enough upset to seal off any gas before the bullet was free of the case, would not this be the more desirable condition? Which would be better in preparing cases for the bullets—would one size the case neck for a short distance and then expand for a snug bullet fit, or size the case neck down a little further and expand the case mouth only, so that a snug bullet fit is obtained a distance from the case mouth, but with clearance between bullet and case mouth? How do the experts do it?

The previous controversy on bullet-groove diameter was most interesting. No doubt others, as well as myself, gained a lot of information from the debate—that's what we need more of. Personally, I do not think bullet diameter within a "Tenth" or so is too critical, especially if the chamber neck—case neck—chamber throat dimensions are such that the bullet is squeezed down the barrel, like poking an oyster in a slot machine!

Too, while I'm at it, please give me a method of cleaning lead wire. I have a batch of lead wire that I cannot afford to throw away that sure presents a problem. It has a black coating that appears to be a preservative, and not corrosion. Sandpaper is the only means I have found, so far, that will remove this coating. It sure is a job.

Very truly yours,

Doak Criss
Longview, Texas

Dear Sirs:

I am pleased to renew my subscription to Precision Shooting and here is why: I am 76 years young and have been shooting since I was a barefoot country boy and have never lost my enthusiasm and enjoy every minute of it.

I do not think there is any sport that can be enjoyed over so many years of a normal life as shooting. I am a member of the West Coast Rifle Club of San Diego, California and am still active in competitive shooting and come home with a medal now and then. We have a nice climate here for shooting, we never have to miss a Sunday or Saturday on account of the weather.

I enjoy all your articles on the techniques of gun tuning and hand loading, but regard bench shooting as more of a test of equipment and hand loaded ammo than personal ability; at least this has been my experience and I do not say that I dislike it.

Sincerely,

C. A. Kyle
Escondido, Calif.

REPORTS of your experiences and experiments in shooting and equipment might be interesting and helpful to others. We welcome such reports which we can pass along to benefit others.

ARE YOU helping to train any junior shooters? That should be considered a civic duty and responsibility by every experienced shooter. Actually, it is fun and a most satisfying chore.

TESTING

A considerable number of experienced smallbore and high-power riflemen maintain that testing of ammunition, rifle, or rifle-ammo combination should be done from the standard prone position, with possibly the aid of a rest for the back of the hand supporting the rifle forearm.

This method may well be the best for riflemen with demonstrated top scoring ability, who keep in constant shooting training, and can hold a rifle so steadily in the prone position as to have a very, very small error of aim from shot to shot.

However, it is this writer's opinion (and at least some others agree) that the run-of-mill target shooter, who seldom if ever can **win** an open match under ideal shooting conditions, may get more reliable **testing** results from use of the standard bench rest method, after familiarizing himself with the bench rest method of shooting.

This run-of-mill shooter may normally shoot no oftener than once a week. He is usually not physically in top shooting condition, and his muscles tire during even a 20 shot string. He may find it difficult to consistently keep his aim within the X-ring area of the standard smallbore target (one minute of angle error of aim) for 10 or 20 consecutive shots in the standard prone with sling position.

In contrast, after a reasonable time devoted to trial and practice in the method of bench rest shooting, that same run-of-mill shooter, using a target telescope sight of 10X or higher power, should be able to hold his rifle with very near to zero error of aim while getting his shot off. Since shooting the rifle off rests requires a minimum of muscular effort, the shooter should be able to fire quite a large number of shots without fatigue to materially increase his consistent error of aim. Since the shooter may thus reduce his average error of aim and hold for the fairly long series of shots required for reliable testing, it would seem that he should be better able to learn the potential accuracy of his rifle-ammo combination by shooting from rests rather than from **his** somewhat unsteady prone position. Full confidence in the potential accuracy of one's equipment helps one's normal target shooting.

Since everyone **does** tire after extended effort, such as a long series of shots for testing, even some better shooters in good training might find that their initial testing may best be done from rests rather than standard prone position.

PHT

RANGE IMPROVEMENTS UNDER WAY

It is reported that improvements and expansion is under way at the Forbes Rifle and Pistol Club's Karner Range in Albany County, New York. This range, on which the annual Forbes Long Range tournament is held, is, to the best of our knowledge, the only club owned range in the East with facilities for 1000 yard shooting.

Two new target carriers and number panels are being installed at the 1000 yard butts to make a total of twelve targets available.

It is planned to widen the 1000 yard firing point, and to regrade and widen the 800 yard firing point, which has not been used in recent years.

The Forbes Sixth Annual Long Range registered tournament in 1959 has been scheduled for the last Saturday and Sunday in July, with entrants limited to 48.

Shooting Rules Indefinitive

(Continued from Page Seven)

under). To this plate was welded a socket, into which could be fitted rearward-projecting rods and weights, various lengths—about 18 inches worked well. Ending up with a 30 to 35 lb. rifle, with normal weight on the left arm, remainder taken by the right shoulder.

With usual equipment, I am in the 85-90 group, on standard indoor offhand targets. With this contraption, I could average 95-plus. You let the cross-hairs coast around slowly until in the ten ring, then yanked. You got either a 10 or a 9. It was that simple. Awkward—yes. Too heavy—no. I used it in a 50-shot match before it was banned.

Rules are the essence of any sport. So I was provoked when the authorities horsed around and gave me a lot of seeming mendacity and double-talk. And practically all of them did. Finally after about 3 years of this, they added a few words to the description of permitted rifles, to prohibit. But the rules are still wide open, and indefinitive, on other possibilities.

Jerome Taylor
2250 Seminole Ave.
Detroit 14, Mich.

THE ULTIMATE IN RIFLE PRECISION

1958 EDITION

The Ultimate In Rifle Precision is not a new book. The first edition of "The Ultimate" was published in 1949, for the then Bench Rest Shooters Association. A second, revised edition was published in 1951 and a third in 1954. These first three editions were all sponsored by the Bench Rest Shooters organization and their contents were almost entirely devoted to information about bench rest shooting, equipment and the bench rest shooters' organization. The first three editions were known as bench rest shooters' "Year Books," though they were never published annually.

Colonel Townsend Whelen edited all these editions, as he has the fourth or 1958 edition of "The Ultimate," writing a number of the chapters himself, while other chapters were written by shooters experienced in special lines.

In 1957 it became evident that the supply of copies of the third edition (1954) would become exhausted (out of print) before the year was over. The publisher felt there was desire for a new edition and Colonel Whelen was willing to edit a new, revised edition. The matter of continued sponsorship by the National Bench Rest Shooters Association was considered by that organization's Directors at their annual meeting in 1957. That body declined to sponsor a new edition under the conditions suggested by the publisher, but voiced no objection to the publication of a new edition so long as it was not publicized as a National Bench Rest Shooters Association, Inc. sponsored book.

Some of the individual NBRSA members did believe a new edition of the book was needed and volunteered their assistance in revising material for a new book, and they, with the Precision SHOOTING editor, encouraged Colonel Whelen and the publisher (The Stackpole Company) to go ahead with the new edition. So much for background information.

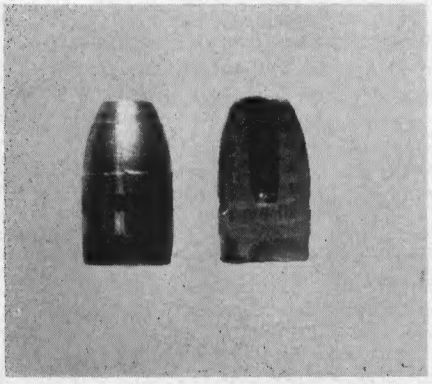
(Continued on Page Fifteen)

Precision Bullet Casting

(Continued from Page Five)

fore adding pressure. My machine doesn't leak when left under pressure all night. It has a gas check seater. A separate double "C" clamp holds the Lubri-Sizer to the bench with no strain on the frame. Bullet feeding is fast and easy. This wasn't made to compete with low priced sizers in price or performance, but is for those who want quality. Dies are in 26 calibers from .2240 to .4575. They also fit the old model Lubri-Sizer that is good, but inferior to the new model.

Moulds by Hensley & Gibbs and Lyman are good. Target handgunners favor the superb H & G multi-cavity jobs, the 4-hole being most popular. Lyman now makes a 4-hole number. Both firms supply specification moulds to Lakeville Arms for the deadly and accurate Prot-X-bore and Jugular bullets. These can be cast by individuals to nearly equal the factory swaged bullets. Once in a blue moon a mould with a cavity cut at an angle, or some other defect turns up. The maker should, and will gladly replace it. But let's be fair and don't ask for a replacement for a mould ruined after you got it, which accounts for more than 99% of defective moulds. These will be discussed later.



Lyman's new 34 Gr. Kay-Chuk H. P. Bullet No. 225107. Photo by Kent Bellah for GUNS Magazine.

NEW .22 LYMAN MOULD
By Kent Bellah

Lyman's line of around 500 moulds has been increased by the addition of a new .22 caliber, No. 225107, that I designed with their cooperation. It casts 34 gr. H. P. and 38 gr. solid Gas Check bullets especially for the Harvey .224 Kay-Chuk wildcat revolver, but is equally good in rifles. In fact, K-Hornet rifles handle Kay-Chuk ammo with efficiency. Companion handgun-rifle combinations make interesting hunting and target plinking guns.

Jacketed .22 bullets are quite inexpensive for precision shooting, but cast bullets hold shooting costs to a minimum for plinking and practice. The new Lyman bullet has a flat nose, and the hollow point number has a large, deep cavity to insure expansion with the rather hard alloys that must be used for best accuracy with high velocity. I recommend the hollow point. Tests are not complete, but in the Kay-Chuk, 8 grains 2400 is a good load that starts at 1,823 fps, and is a far better killer than a .22 L. R. cartridge in a rifle. After playing with several alloys to determine the softest mix that would hold accuracy at reasonable velocity, 3.25% tin and 3.50% antimony gave the best initial results.

Fired in moist sand the bullet sheds the nose and expands to about .32 caliber. Further experiments with charges and alloys will probably turn up a better combination. With 3.5 grains Bullseye, for around 1,500 fps with the same alloy, the punch is adequate for squirrel size game. 2.5 grains Bullseye for plinking targets has a velocity near the 950 fps listed for .22 L. R. match ammo. Casting small bullets is not as easy as for larger calibers that are less sensitive to minor defects. Careful casting, inspection and seating of gas checks is necessary for precision ammo.

My bullets shot well when sized .225, some .001" larger than the cylinder throat. The entire bearing surface must be seated in the case for easy chamber-

(Continued on Page Fourteen)

New 22 Lyman Mould

(Continued from Page Thirteen)

ing. This doesn't "sound" good, but groups are okay. Bullets "caught" showed little deformation from firing. Lyman may cut their cherry so bullets will cast no larger than .224 ahead of the grease groove, which will allow them to be seated out. It's impossbile to make moulds cast bullets of an exact diameter as the size varies with the alloy. An exception, of course, is the Harvey Prot-X-bore S. F. M. mould that casts bullets of pure, unalloyed lead ready to shoot without lubrication.

You can adjust your seater for this cast number, and back it out about ¾ turn for jacketed pills. Or size bullets .224". Small bullets especially, and hollow points in particular, are best cast with a SAECO Thermostat Controlled Furnace. With the furnace half full or more, you have a heavier head of metal that helps expell internal air pockets, and fills out bullets better. The uniform temperature gives a more uniform density and a more uniform bullet, with slag and foreign material practically eliminated. These faults are the major causes of cast bullet inaccuracy in any caliber. They are magnified in small bore. You can tell the difference by comparing bullets cast from the same alloy with an ancient pot and dipper, with those cast in the furnace. Just weigh and sort!

The Kay-Chuk, written up in these columns before, is a humdinger stingaree for novice or expert. You get plenty of Bang!, but no recoil from this most sporting revolver, and the world's highest velocity handgun. The Hornet case shortened .050" gives uncanny accuracy with extremely flat trajectory at long range. Best initial load was the 35 gr. Sisk rifle bullet ahead of 9.5 grs. 2400 for 2,200 fps, that opened a larger exit hole on varmints than factory .357's.

Sisk Bullet Co. cooperated when I designed the first jacketed .22 handgun pill for the world's highest velocity, the Sisk 37 Gr. Revolver Bullet, constructed somewhat like the Harvey Jugulars. Like the famous Jugulars, the short jacket and soft lead core with a deep hollow point allows up to 25% increase in the powder charge. I've fired 12 grs. 2400 in a Kay-Chuk! I've settled on 11 grs. as "adequate," which it is, and there is less muzzle flash. I've already Kay-Chuked more varmints than many handgunners bag in a lifetime. Bullets generally rip a 3 or 4" entrance hole, blowup in the boiler works and blow the vitals out the ENTRANCE hole!

Internal explosion eliminates pinpointing hits in vital areas for sure kills. Factory .357 Magnums make a caliber-size entrance hole and about a .50 caliber exit. All loads were in Remington cases, as they have greater capacity. I highly recommend C. C. I. Small Pistol primers with light or hot loads. Federal and Remington makes have been tested, and can be substituted if necessary.

Lehigh Chemical Co., Chestertown, Md., who make the famous Anderol gun lubricants that are as good as their ads claim, sent us samples of their Bullet Lube No. 867 and 586B, that are not yet on the market, but I hope one or both is soon. These came when we were testing several alloys for cast bullets in several calibers, requiring thousands of shots. Both white lubes are excellent; probably superior in lubricating quality, and certainly superior in being clean to handle

TRADIN' POST

Classified type ads; no display. **Rates:** — 10¢ per word per insertion, prepaid. Minimum charge $1.00. Closing date for ads is the last Saturday of the month preceeding publication.

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FOR SALE: New Anschutz Super-Match in stock for immediate shipment. Used Winchesters and Remingtons. Clyde Speight, Dunbar, Pa.

and shoot. They both size clean and stay put. Tests show that oil won't melt out under high temperature to kill the powder or primer. Handloaders have needed a better lube for a long time. This may be it.

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The Ultimate In Rifle Precision 1958 Edition

(Continued from Page Twelve)

As is normal in revising a new edition of an old book, basic information which has characterized the book is retained, with some obsoleted material deleted and more up-to-date information added. The 1958 edition of "The Ultimate" is quite heavily "bench rest," and rightly, both because of the characteristics of earlier editions and because the progress in rifle accuracy by the bench rest shooters has had a very considerable influence on the fabrication of rifles for other types of shooting in recent years. However, the scope of the 1958 edition of "The Ultimate" has been broadened to include other types of target rifles and sporting rifles.

Chapters on the Bench Rest Shooters organization and rules is brought up-to-date to the 1957 season. NBRSA recognized group and aggregate records are up-to-date to the end of the 1957 shooting season. Only one group record and one aggregate record were broken in 1958. Information on bench rest rifles is brought up-to-date through 1957.

Chapters on the bench rest rifle, smallbore and big bore target rifles, varmint and big game rifles are written by Colonel Whelen, while Roy F. Dunlap has done very well the chapter on The International Match Rifle.

The chapter on Rifle Barrel Making by G. R. Douglas provides the most complete information on the "button rifling" of rifle barrels that this reviewer has seen to date. There is also information on the new Timken Special Steel, No. 17-22 A (S) which has been developed by The Timken Company especially for rifle barrel making.

Creighton Audette, Springfield, Vermont gunsmith, and Vermont State champion in both outdoor smallbore and bigbore rifle for several years, has a very comprehensive chapter (some 30 pages) on Stock Bedding, for both target and sporting rifles.

Chapters on Sights, Bullets, Jacketed Bullet Making and Tools have been brought up-to-date. In this reviewer's opinion, the chapter on Handloading For Accuracy is a weak one. It does have the saving grace of being short with no duplicating of detailed information contained in the standard reloading hand books. The standard loading hand books are listed and recommended. It does seem regrettable that some of the many more experienced handloaders could not have been induced to collaborate on a chapter giving information on the little details of loading that make the difference between top-notch target accuracy ammo and just ammo handloads.

The long experienced shooter, even bench rest shooter, will only find "bits" of new information in this 1958 edition of "The Ultimate," but for those people, that is true for just about any shooting book. But for the beginner, especially in bench rest shooting, the book will provide a great deal of information that will be helpful and valuable. Even experienced shooters should find enough of worth in the book to make it a desirable addition to their shooting reference library.

PHT

NEXT MONTH—an article on double-action revolver shooting for accuracy. Some competitive target shooters are using the double-action method with excellent success.

SHOOTING MATCHES are the measuring sticks for comparative ability of both shooters and equipment. Shoot reports giving both measurements are most interesting and informative.

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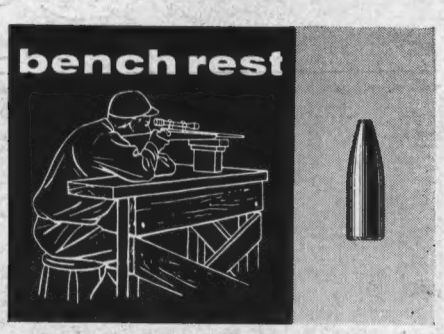

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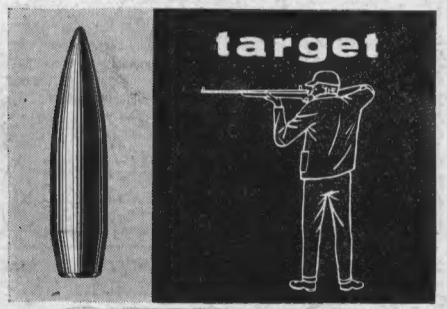

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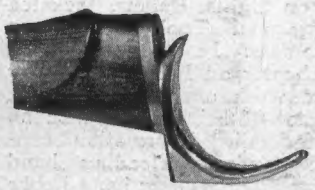

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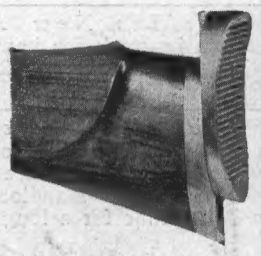

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